The Chicken Little Syndrome and Migratory Songbirds

Frances C. James
Department of Biological Science
Florida State University
Tallahassee, FL 32306-2043 USA

Charles E. McCulloch
Biometrics Unit
337 Warren Hall
Cornell University
Ithaca, NY 14853 USA

David A. Wiedenfeld
Museum of Natural Science
Louisiana State University
Baton Rouge, LA 70803 USA

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The recent report by Robinson et al. (31 March, p. 1987) and the accompanying Perspective by Askins (31 March, p. 1956) prompt us to offer a different view of the issue of declining migratory songbirds. The point we want to make is that indicating the limits of the generality of research can be as important as the research itself. Unwarranted generalizations can evolve into inferences about causal relationships, which are likely to get repeated as facts, which can then become the basis for management decisions. In spite of the perceived urgency of conservation issues, there are times when the most responsible answer to questions about what environmental factors are limiting populations is "I don't know. The research doesn't address that question for the geographic area you are asking about," or, "The research is about only some components of mortality. Other factors potentially affecting population regulation were not addressed." The papers by Robinson et al. and Askins can be used to illustrate this point.

For nine species of birds in midwestern states, of which eight were long-distance (Neotropical) migrants that nest in forests or woodlands, Robinson et al. found negative correlations between the percent of forest cover in circles of 1-km radius and both the proportion of nests parasitized by brown-headed cowbirds (Molothrus ater) (1) and the nest predation rate on eggs and nestlings by other birds and small mammals. The results of this research, which we are not

criticizing, was then generalized, beginning with the innocuous statement by Robinson et al. that "increasing fragmentation of landscapes could be contributing to the widespread population declines of several species." This statement presupposes that forest-dwelling Neotropical migrants are declining over broad geographic scales and suggests that at least part of the cause is forest fragmentation. These ideas were then extended first by Askins and then by the media.

A national press release on 12 May by the U.S. Fish and Wildlife Service about how much birding means to the economy ($5.2 billion dollars annually), quoted its director, Mollie Beattie, as saying that bird numbers are declining because of the loss and fragmentation of habitat. Les Line's headline in the New York Times was, "Songbird population losses tied to fragmentation of forest habitat" (2). The Associated Press stated that migrant songbird populations are in steep decline in the Midwest and that parasitic cowbirds are the principal cause (3). These are examples of unwarranted generalization. What we actually know is that some species of migrant songbirds are declining and some are increasing (4). Some of the declines are attributable to habitat loss. Overall population declines caused by forest fragmentation, independently of other habitat change, may be occurring, but so far there are no examples.

How did this generalization beyond the conclusions properly allowed by Robinson et al.'s study come about? In the study, the numbers of nesting birds were apparently not declining, even in the most isolated forests in central Illinois, which had the highest populations of cowbirds, the highest rates of nest predation, and the lowest rates of nesting (reproductive) success. Robinson et al. therefore proposed that there must be regular immigration from distant populations in less fragmented landscapes (5), a phenomenon generally referred to as source-sink population dynamics. This hypothesis may be correct, but, as Robinson et al. say, it would take demographic and dispersal data for individually marked birds to confirm it.

Without being specific about the species involved, and assuming as a premise that general declines in forest-dwelling long-distance migrants are occurring, Askins says that Robinson et al.'s findings about the association of landscape-scale habitat fragmentation, predation, brood parasitism, and nest productivity in forest birds in midwestern agricultural settings account for the declines of forest-dwelling long-distance migrants in the eastern states generally. (See also ref. (6).)

First comes the question of whether or not declining populations of long-distance migrant birds that nest in forests in the eastern United States are in fact a conservation crisis. Although it is not without its own

problems as a sampling regime (4, 7), the comprehensive broad-scale government-based Breeding Bird Survey (BBS) is thought to be the most reliable source of information about population trends in North American land birds. The results indicate that since the mid-1960's more species of Neotropical migrants increased than decreased. Woodland birds, including long-distance migrants, have been faring better than grassland or shrubland birds (4), both in eastern North America and across the continent.

Why then do we read so much about declining Neotropical migrants? It is reasonable to suspect such declines, and there is strong evidence of declines in a few species, but we think the evidence usually cited for declining populations in Neotropical migrants as a group does not justify the special attention being given to them. The results of some Breeding Bird Censuses in isolated forest study plots show declining numbers of migrants (8), but these plots are not necessarily representative of trends in the thousands of square kilometers of these species' geographic ranges (9). Evidence from radar data indicate decreasing numbers of migrants coming northward across the Gulf of Mexico, but the data are too limited to allow reliable conclusions about long-term trends (10). Finally, although analyses of data from the BBS indicate decreasing numbers since the early 1980's (11-13; see 7 for a counterexample), there is no causative justification for breaking the data set, which begins in 1966, at 1980.

What are the trends as estimated by BBS in the species studied by Robinson et al. for the eastern U.S.? We give them in the order of magnitude from increasing to decreasing. The red-eyed vireo (Vireo olivaceus), worm-eating warbler (Helmitheros vermivorus), ovenbird (Seiurus aurocapillus), acadian flycatcher (Empidonax virescens), scarlet tanager (Piranga olivacea), and indigo bunting (Passerina cyanea) have overall increasing trends. The Kentucky warbler (Oporornis formosus) and wood thrush (Hylocichla mustelina) are estimated to have decreasing trends. The only statistically significant decreasing trend in the above list is for the wood thrush. In sum, six of the eight migrants studied by Robinson et al. are not known to have declining populations in the eastern United States (12, 14).

Askins' generalization about the cause of declining populations of migrants in the East has further problems. It presupposes that forest fragmentation, cowbird parasitism, and predation are increasing in the East. Indeed, there is evidence that predation on wood thrush nests in Pennsylvania is higher in small forest fragments (15), but the percent of wood thrush nests parasitized by cowbirds is substantially lower in the eastern states than in the midwest (16). Analysis of BBS data indicates that cowbirds have been declining in the eastern states for several decades (11, 17). Our unpublished studies of BBS data show that the rate of decline in the wood thrush is highest in the Appalachian

Mountains, an area where forest fragmentation is not a major issue. In fact, one of the major land-use changes in the East since about 1920 is that former farms and pastures have been reverting to mature forest (18). These countervailing processes (fragmentation in some areas and the reversion of formerly cleared areas to mature forest in others) would have to be incorporated into a proper causal analysis of population trends in forest birds for the region as a whole. Aside from all these problems, observational research on sources of nesting failure alone are insufficient for the determination of factors that limit the densities of bird populations. The examples of research that have been successful in identifying limiting factors have all included some form of an experiment, in which there is some control over alternative explanations (19).

We know that some species of birds in the United States are critically endangered, and we want to be alert to early indications of future problems involving environmental degradation. Without more attention to sampling procedures and data analysis and either experiments or applications of experimental design to analyses of alternative causes in observational studies (20), however, recommendations for management would surely be premature. We cannot agree with Robinson et al.'s recommendation for trapping cowbirds in severely fragmented landscapes (21). That tactic has been notoriously ineffective in the past (22) except in cases of an

immediate threat of extinction of the host species (23). Nor do we agree with Askins's statement that Robinson et al.'s work confirms that cowbirds or predators are causing declines in forest songbirds in the East.

The most prudent strategy for research on the conservation of Neotropical migrants would seem to be to find out where the declines are most severe in those species that are declining and then to find out what environmental factors are limiting their populations (4, 7, 20, 24). Again, we have no complaint about the research by Robinson et al., only about the subsequent unwarranted generalizations and causal inferences. Robinson et al. have shown that landscape-level factors are associated with rates of cowbird parasitism and predation on nests of songbirds in agricultural landscapes in the midwest. Askins then generalized this result to fragmented landscapes in the eastern states, assumed declining populations, and declared the relationship to be causal. These problems of unwarranted generalization and attribution of causes without designing comparisons that allow for and eliminate alternative explanations pervade the scientific literature on this subject. They get picked up by the media and are touted as new results of research. Ultimately, they will undermine the credibility of conservation biologists whom Askins himself has warned are susceptible to the Chicken Little Syndrome (8). It is the responsibility of the scientists themselves to state

explicitly what can and cannot be legitimately inferred from their research.

Frances C. James
Department of Biological Science
Florida State University
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Charles E. McCulloch
Biometrics Unit
337 Warren Hall
Cornell University
Ithaca, NY 14853, USA

David A. Wiedenfeld
Museum of Natural Science
Louisiana State University
Baton Rouge, LA 70803, USA

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